CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME II

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PURIFICATION OF SUPEROXIDE DISMUTASE FROM *Hevea brasiliensis* LEAF EXTRACT

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ABSTRACT

Superoxide dismutase (SOD) extracted from *Hevea brasiliensis* provides very useful industrial enzyme for pharmaceuticals and skin care products. This study aims at optimizing the process condition which leads to the highest SOD yield. A statistical experimental approach using Central Composite Design was applied in the ion exchange chromatography (IEC) purification step by varying the concentration and the pH of the protein buffer. Results show that the SOD from *Hevea brasiliensis* leaf extract is optimally purified using 50mM Tris HCl buffer at pH 7.5. Results show that a total of 2.37 mg protein was successfully purified which corresponded to 40183.14 U of SOD activity from crude protein extracted from 50g fresh leaves. The study was significant to establish an alternative way of utilizing the *Hevea brasiliensis* leaf, converting it to value-added product such as SOD. At the same time the growers may garner additional income because they can sell both their latex as well as rubber leaves.

Keywords: *Hevea brasiliensis*, superoxide dismutase, purification, *hevea* leaf extract, ion exchange chromatography

INTRODUCTION

Malaysia is one of the largest producers of natural rubber. In Malaysia, *Hevea brasiliensis* are planted all over the nation. The extracted latex from *Hevea brasiliensis* were used for the consumption of the various rubber-based industries and the timber are important in furniture industries. However, the leaves are left to fall and rot instead of being made used to garner additional income to the farmer and to the nation.

Superoxide dismutase (SOD) (EC 1.15.1.1) is the first line of defense against oxidative stress. The function of SOD is to destroy radicals which are normally produced within the cells and which are toxic to biological systems. SOD protects oxygen-metabolizing cells against harmful effects of superoxide free-radicals (Fridovich, 1995; Park and Soo, 1999). It catalyzes the destruction of the O^{2-} free radical as follows:

$$2O^{2-}(\text{superoxide}) + 2H^{+} \rightarrow O_2 + H_2O_2$$